Integrated Collaborative Environment (ICE)

National Aeronautics & Space Administration
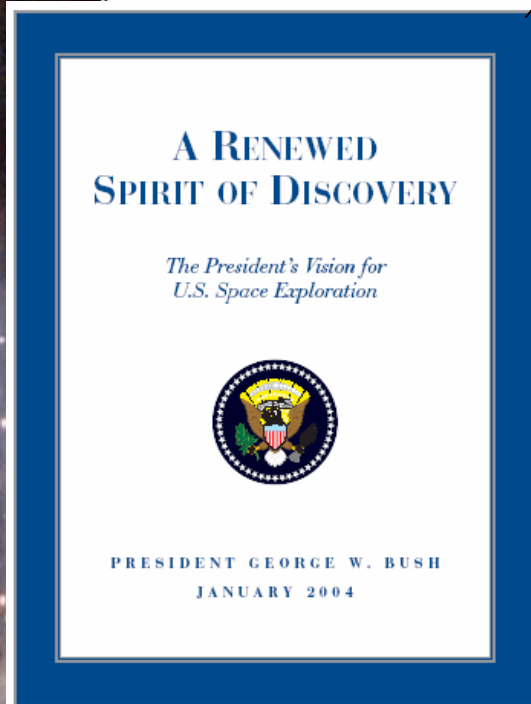Exploration Systems Mission Directorate

(b)(4)

ICE Program Manager

The Vision for Space Exploration

THE FUNDAMENTAL GOAL OF THE VISION IS TO ADVANCE U.S. SCIENTIFIC, SECURITY, AND ECONOMIC INTEREST THROUGH A ROBUST SPACE EXPLORATION PROGRAM

A RENEWED SPIRIT OF DISCOVERY

The President's Vision for U.S. Space Exploration

PRESIDENT GEORGE W. BUSH

JANUARY 2004

Implement a sustained and affordable human and robotic program to explore the solar system and beyond

Extend human presence across the solar system, starting with a human return to the Moon by the year 2020, in preparation for human exploration of Mars and other destinations;

Develop the innovative technologies, knowledge, and infrastructures both to explore and to support decisions about the destinations for human exploration; and

Promote international and commercial participation in exploration to further U.S. scientific, security, and economic interests.

What is the ICE?

ICE is a **web-centric** environment which will be **used by industry, academia and government** for: sharing, collaborating, integrating, accessing and controlling **management information and product data** defining all of the products which are part of Exploration Systems.

In Work | Under Review | Approved | Rework | Rejected | Cancelled

- Single source access to all ESMD data

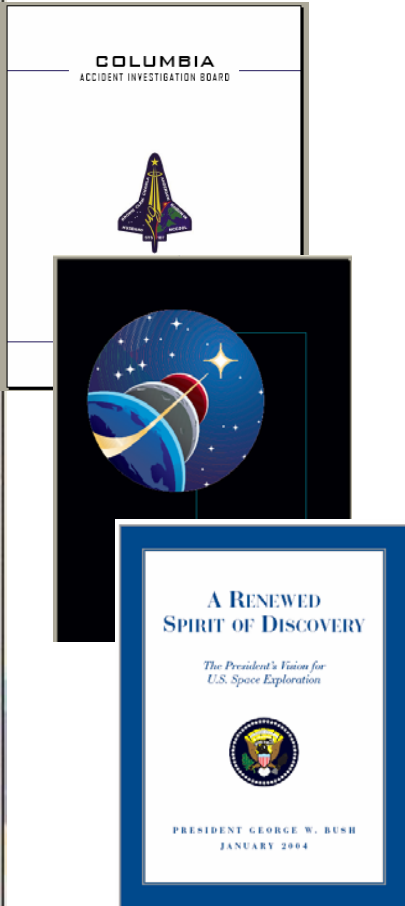- Integrated programmatics

- Accessibility from anywhere in the world

ICE is the authoritative source for all program data
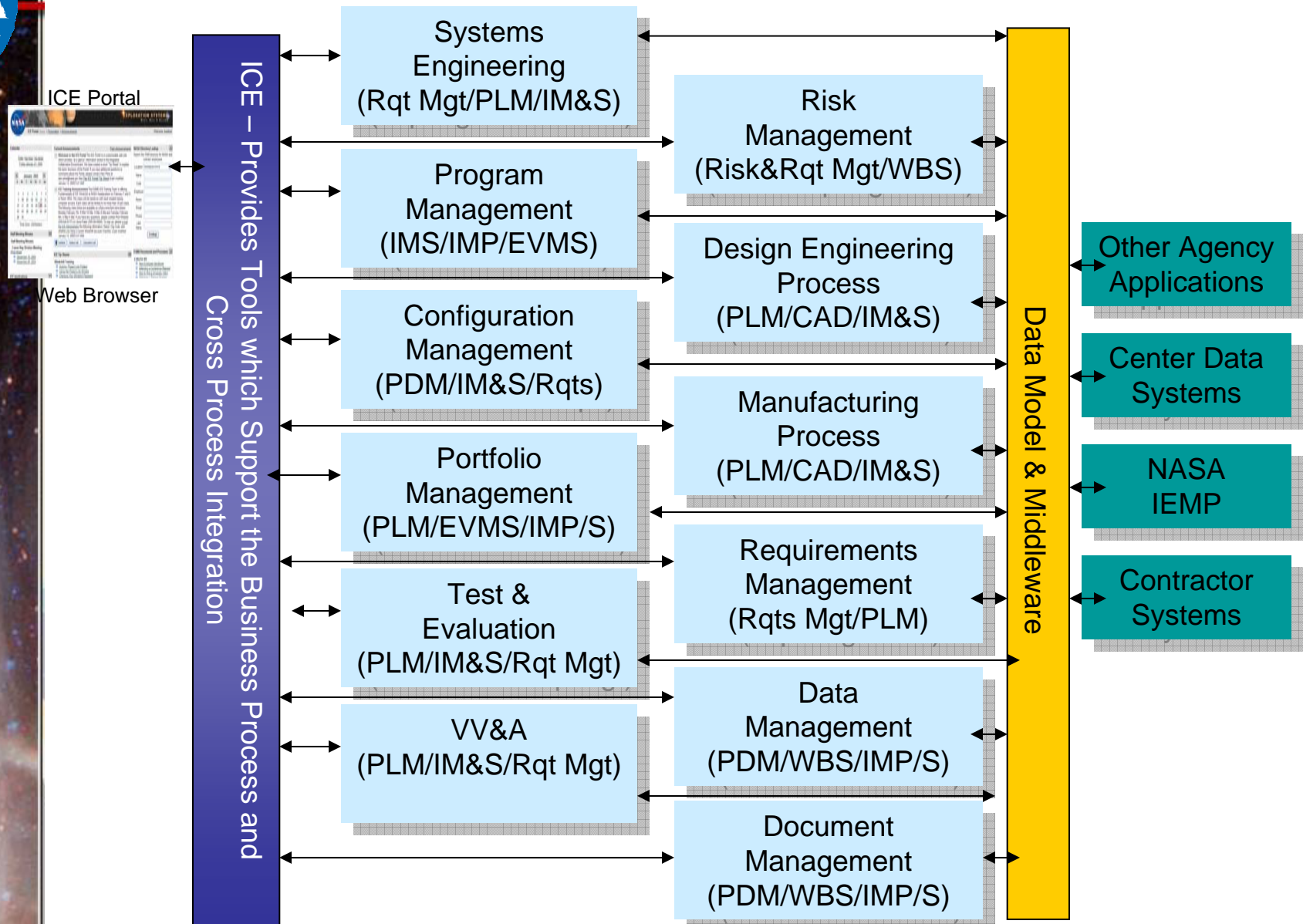
Why are we implementing ICE?

- ICE Improves Mission Assurance and Mission Safety:
  - Ensures availability of all data related to ESMD products during ESMD operations – key lessons learned from Shuttle & Space Station

- ICE Reduces ESMD Program/Project Performance Risk By:
  - Providing better program visibility, control and decisions throughout the program life cycle
  - Enabling assessment and review of ESMD Program/Project components throughout the development life cycle
  - Enabling virtual test and evaluation of digital representations of systems

- ICE Compresses ESMD Program/Project Delivery Schedules By:
  - Enabling simultaneous development and synchronized releases of multiple independently developed systems as a deployable package to NASA
  - Acceleration of alternative designs and systems for ESMD
  - Providing a single collaboration environment enabling the compression of numerous critical process life cycles.

- ICE Reduces ESMD Program/Project Cost By:
  - Improves communication amongst the various systems and sub systems along for faster incorporation of designs and completion of tasks
  - Better and faster selection and incorporation of technologies

ICE Integrated Process View

ICE Portal

Web Browser

ICE – Provides Tools which Support the Business Process and Cross Process Integration

- Systems Engineering (Rqt Mgt/PLM/IM&S)
- Program Management (IMS/IMP/EVMS)
- Configuration Management (PDM/IM&S/Rqts)
- Portfolio Management (PLM/EVMS/IMP/S)
- Test & Evaluation (PLM/IM&S/Rqt Mgt)
- VV&A (PLM/IM&S/Rqt Mgt)

- Risk Management (Risk&Rqt Mgt/WBS)
- Design Engineering Process (PLM/CAD/IM&S)
- Manufacturing Process (PLM/CAD/IM&S)
- Requirements Management (Rqts Mgt/PLM)
- Data Management (PDM/WBS/IMP/S)
- Document Management (PDM/WBS/IMP/S)

Data Model & Middleware

- Other Agency Applications
- Center Data Systems
- NASA IEMP
- Contractor Systems

Integrated Collaborative Environment Tools

- PDM/PLM – Windchill 7.0 (in process of migrating to 8.0)
  - ProjectLink & PDMLink
- Risk Management
  - Active Risk Manager
- Integrated Master Schedule
  - Primavera
- Earned Value Management
  - Primavera & wInsight
- Requirements Mgmt/Systems Engineering
  - Cradle
- Dashboard
  - Leveraging existing tools & web services in a services oriented architecture
- Middleware
  - Tibco
- Portal
 - Vignette

Immediate Needs with No Infrastructure
Timeframe : April 2004 – July 2004

The Focus
- *A document & process management system to support procurements*

- *Design an IT architecture and support environment for a program extending to 2030*

Guiding Principles
- *Understand needs, requirements, and management emphasis*
  - *Establish and communicate expectations often*
  - *Ensure/Require management buy-in*

- *Establish a clear vision of the IT Architecture*
  - *COTS - Best in Class Approach*
    - *Select the best tool for a given functional area*
    - *Standards based integration practices*
  - *Web-Based information delivery*
  - *Scalable enterprise solution products*
  - *Focused product/capability delivery with growth path identification*

- *Enterprise Funded, Program/Project Use*

- *Leverage existing agency assets, contracts, and knowledge*

May
2004

July
2004
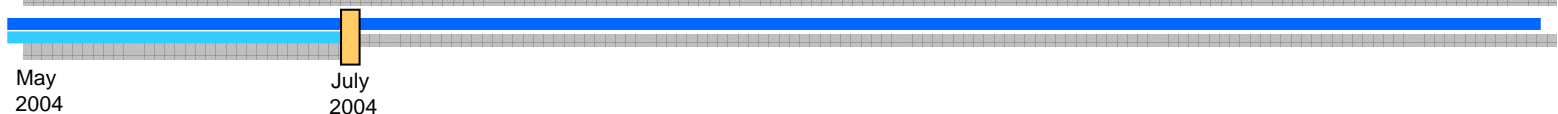
# Stabilizing & Sustaining the Infrastructure

Timeframe : August 2004 – December 2004

The Focus

- *Ensure access, reliability, and continuity of IT services*

- *Add an "operational" component to support users through training and helpdesk services (700 users by Dec 2004)*

- *Streamline information access and delivery systems by users (Single-Sign-On, Portal, Workflows)*

- *Add functionality as stakeholder requested (Earned Value Mgmt, Risk Mgmt, etc)*

Guiding Principles

- *Migrate a "reactive mode of operations" to a structured, responsive environment*

- *Document and enforce process, policy and procedures*

- *Collect and use Metrics to manage the IT portfolio and operations*

- *Recognized user training needs and establish the support organization*

- *Re-use (not re-establish) agency assets (Helpdesk, NDC ops, contracts)*

- *Focus on redundancy, failover, and continuity of operations*

May
2004

July
2004

Dec
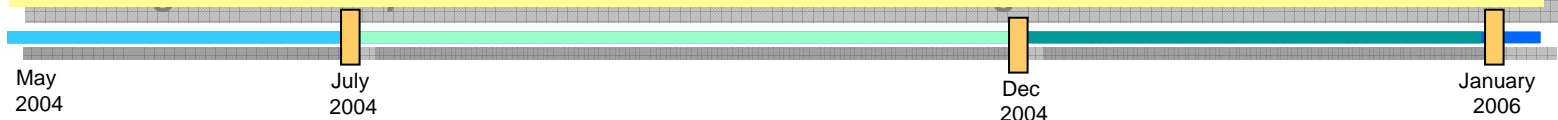2004
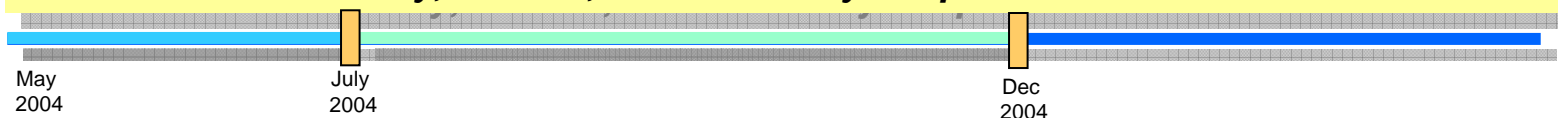
Organization Transformation & Adding Capability
Timeframe : January 2005 – January 2006

The Focus
- *Add functionality to support program management requirements (EVMS, Requirements Management, IMP/IMS, Data Modeling, IM&S)*

- *Upgrade the IT environment to support CEV & CLV activities*

- *Develop the integration layer needed for contract deliverables*

- *Establishing software development processes from life cycle management*

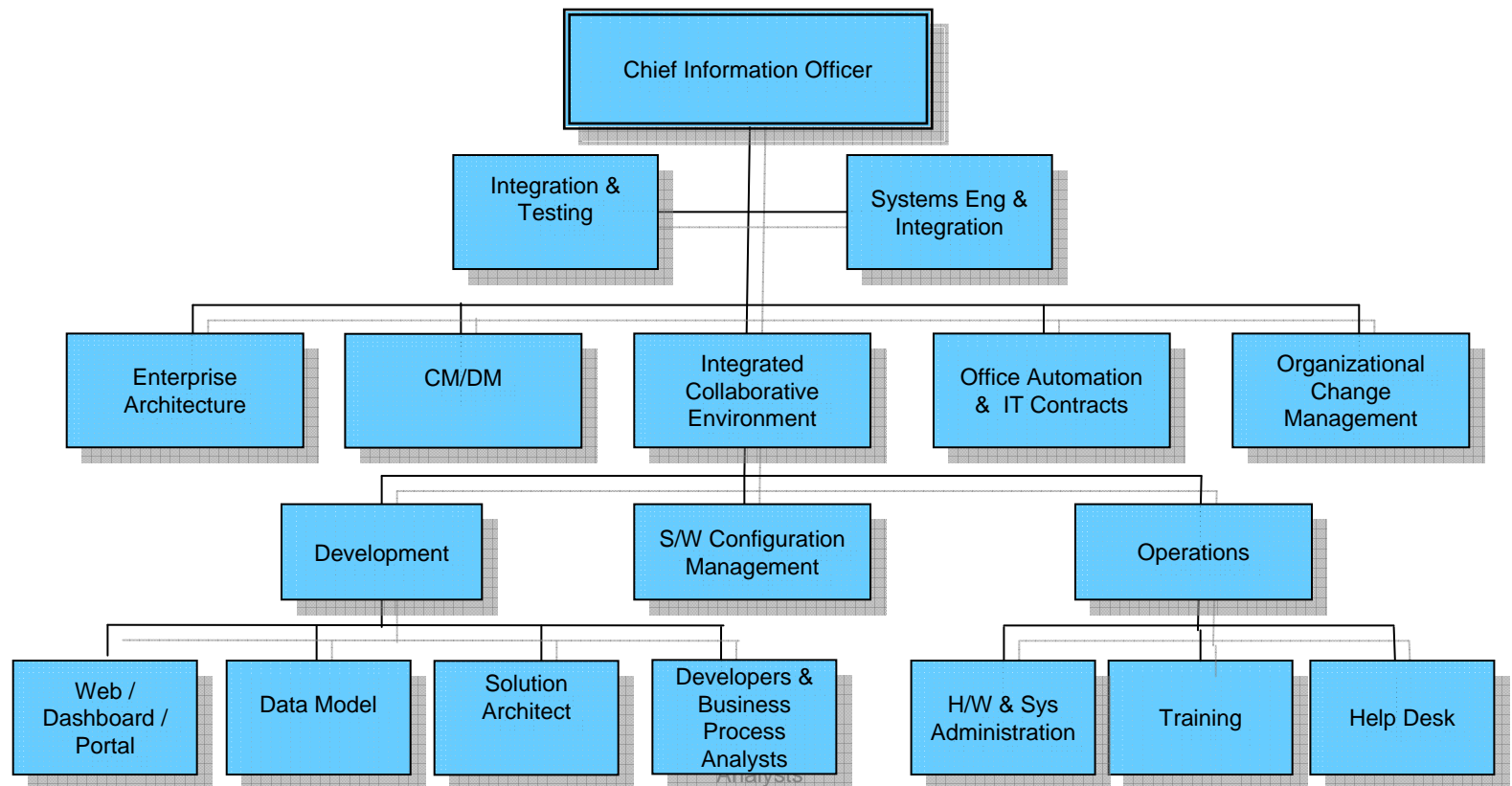- *Align with agency CIO processes (EA, e-Gov, ITS, CPIC, Records Mgmt)*

Guiding Principles
- *Partner with Stakeholders and agency organizations performing similar activities*

- *Develop a JIT approach to providing IT to avoid unnecessary licensing costs*

- *Strategically plan for 6 month, 1 year, 5 year requirements*

- *Reorganize as responsibilities and focus areas change*

May 2004

July 2004

Dec 2004

January 2006

ESMD Office of the CIO

Chief Information Officer

Integration & Testing

Systems Eng & Integration

Enterprise Architecture

CM/DM

Integrated Collaborative Environment

Office Automation & IT Contracts

Organizational Change Management

Development

S/W Configuration Management

Operations

Web / Dashboard / Portal

Data Model

Solution Architect

Developers & Business Process Analysts

H/W & Sys Administration

Training

Help Desk

Infrastructure

- Hardware
  - Located at NASA Data Center (MSFC)
  - Development, Integration, Staging & Production
    - Staging & Production environments are identical
    - Redundancy & failover
  - Storage Area Network (SAN)
- Software
  - Subversion & JIRA
    - S/W Configuration Management
  - TestDirector & LoadRunner
    - Test changes prior to moving new versions/changes to staging environment
  - Remedy
    - Help Desk
  - Oracle 9.x
    - Primary database
    - Architected with redundancy & failover
- Testing
  - Quality control of products released into the ICE environment
  - Test driven development
  - Unit tests
  - Regression tests
  - Load tests

- Training
  - Team located at MSFC
  - Instructor led, web-based, & WebEx
  - Windchill, Active Risk Manager, Portal & Cradle conducted by the ICE team
- Help Desk
  - Tier 1 team located at MSFC
  - Provides support for ALL applications in ICE
  - Use Remedy software to collect metrics
  - Same group supports training
  - Requests submitted via phone and email
- Documentation (short list)
  - ICE Software Development Lifecycle Plan (meets NPR 7150 requirements)
  - ICE Security Plan (meets NPR 2810 requirements)
  - ICE Program Management Plan (meets NPR 7120 requirements)
  - ICE Master Test Plan

ICE Metrics

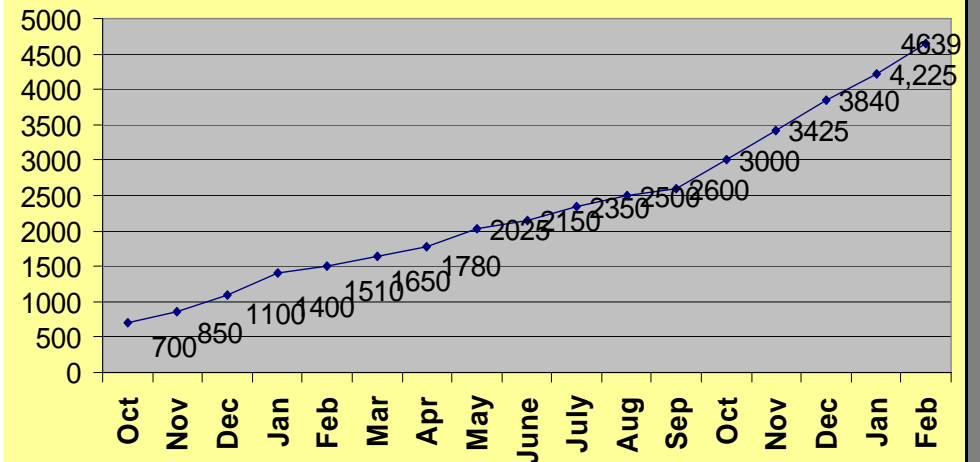## ICE Statistics

NASA Users = 4,639 +

Number of Documents= 81,920+
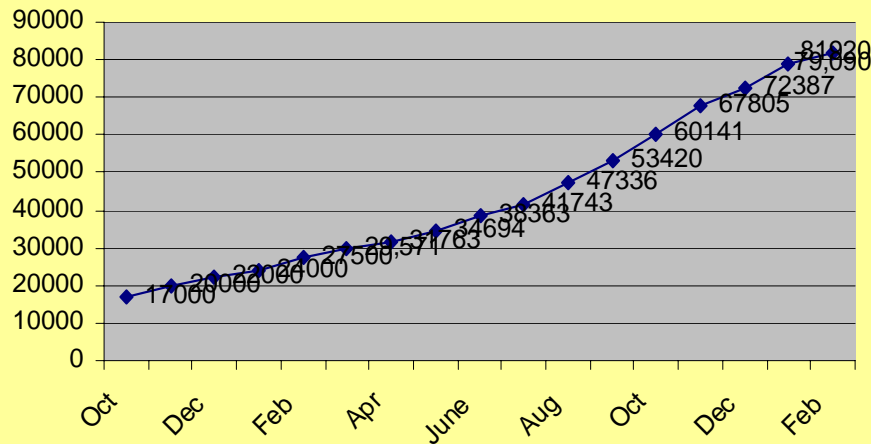
Number of Projects = 376+

Hundreds of workflows and lifecycles running.

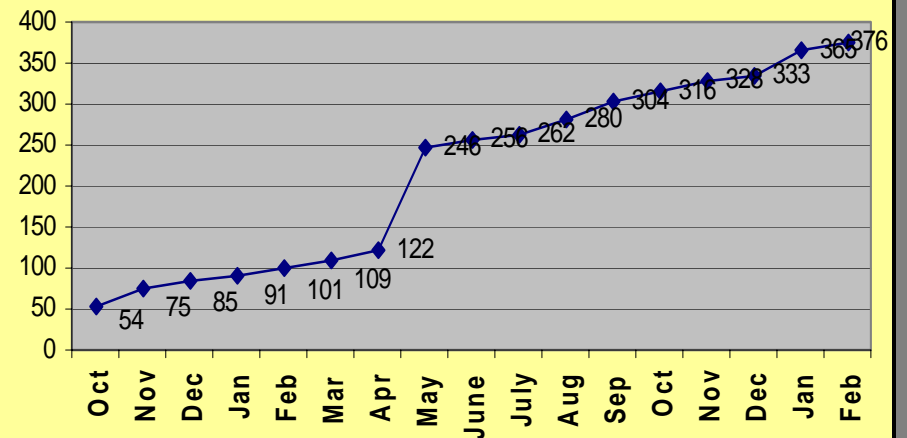All Project Teams actively using ICE to collaborate around shared, in-work and released data.

Users

Month	Value
Oct	700
Nov	850
Dec	1100
Jan	1400
Feb	1510
Mar	1650
Apr	1780
May	2025
June	2150
July	2350
Aug	2500
Sep	2600
Oct	3000
Nov	3425
Dec	3840
Jan	4,225
Feb	4639

ICE Data Content (Documents)

17000, 20000, 22000, 24000, 26000, 27500, 28571, 31763, 34694, 38363, 41743, 47336, 53420, 60141, 67805, 72387, 79,050, 81920

Number of Projects

54, 75, 85, 91, 101, 109, 122, 246, 256, 262, 280, 304, 316, 320, 333, 365, 376

Users by Center for February 2006

Many NASA users accessing ICE from locations outside of NASA.

ARC 225
JPL 191
DFRC 1
186 GRC
161 GSFC
HQ 276
LaRC 273
MSFC 1385
SSC 20
JSC 1452
KSC 469

ICE is available from any Internet connection in the world
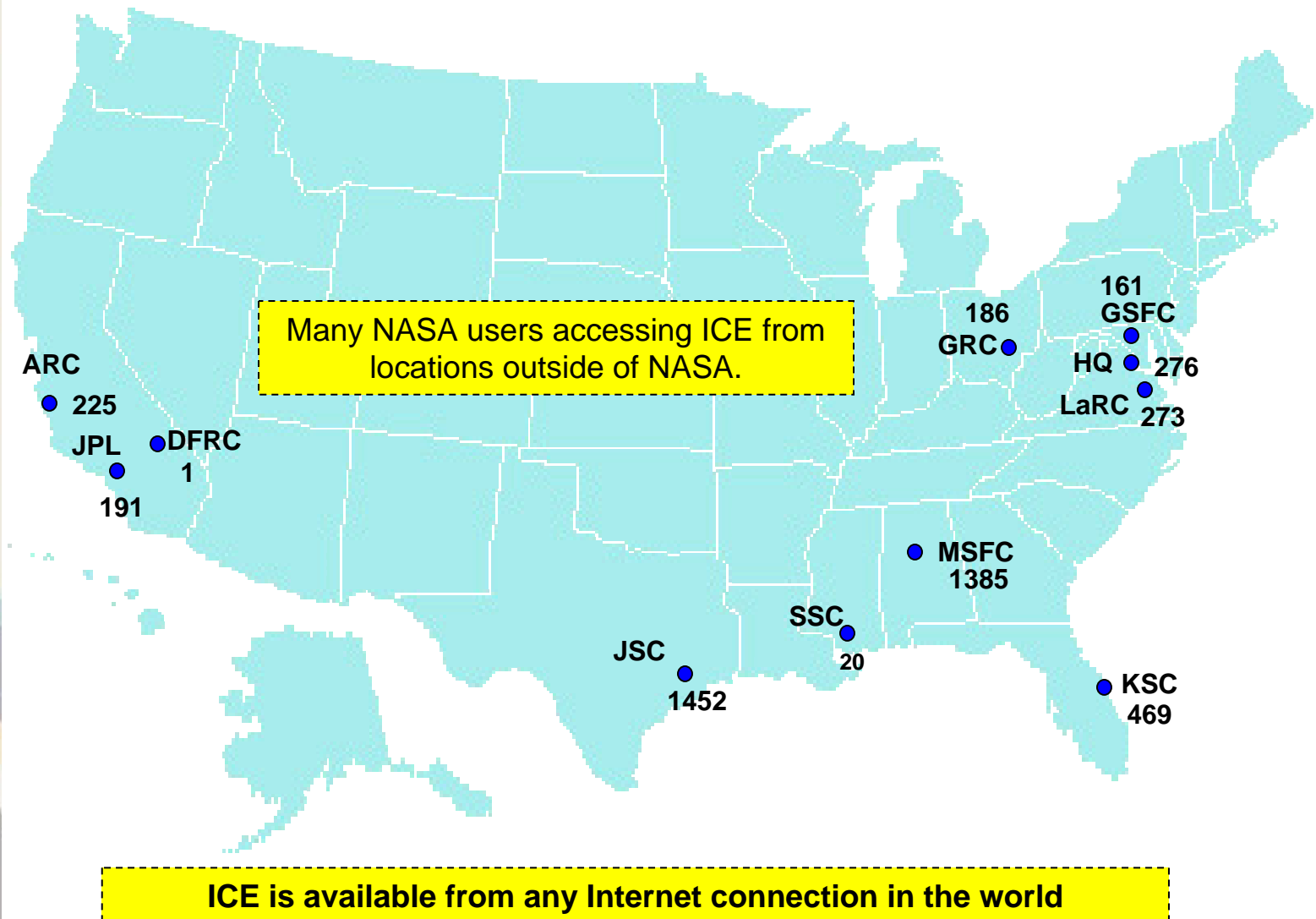
Summary

- ICE is government owned and managed.

- ICE has a scalable and adaptable architecture.
  - Best in class, Web Based (where possible), Commercial-off-the-Shelf (COTS)

- ICE compresses ESMD program/project schedules; reduces risks; reduces costs; and improves mission assurance and safety.

- ICE is more than a data repository. ICE enables, integrates, and supports business processes.

- ICE is more than Windchill. ICE is a set of integrated tools, accessed through a single interface covering the full lifecycle of programs and products.

- ICE will be the means by which contractors deliver data to NASA.

- ICE provides single sign-on

- ICE (including licenses) are paid at the Directorate level

- ICE is the authoritative source of all ESMD data.